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ITEM 7:* PROGRAMME MATTERS, INCLUDING THE IMPLEMENTATION OF THE PLAN OF ACTION TO COMBAT DESERTIFICATION

STRATEGIES FOR THE PROTECTION AND DEVELOPMENT OF THE OCEANS AND COASTAL AREAS

Note by the Executive Director

As requested by the Governing Council in its decision 16/26 B of 31 May 1991, the Executive Director submits herewith for information the completed report on strategies for the protection and development of the oceans and coastal areas.

The first incomplete draft of this document was presented for information (as document IOC/INF-841prov.) to the sixteenth session of the Intergovernmental Oceanographic Commission of UNESCO (IOC) Assembly (Paris, 7-22 March 1991). The Assembly took note of the draft, welcomed the joint initiative of the secretariats of IOC and UNEP, and encouraged the secretariat of IOC to pursue the completion of the document in cooperation with UNEP.

The draft of the highlights of the document was also submitted (as document UNEP/GC.16/21/Add.5) to the sixteenth session of the UNEP Governing Council (Nairobi, 20-31 May 1991). The Council welcomed the cooperation between IOC and UNEP on the preparation of the strategies, approved the completion of the strategy document and requested its submission to the next session of the Council and the Preparatory Committee of United Nations Conference on Environment and Development (UNCED) at its fourth session (March/April 1992).

The secretariat of UNCED was regularly kept informed about the progress in the preparation of this joint IOC/UNEP document, which contributed signif antly to the preparations for UNCED.

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

S T R A T E G I E S

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1. PREAMBLE

1.1 The United Nations Environment Programme (UNEP) and the Intergovernmental Oceanographic Commission of UNESCO (IOC) are major United Nations bodies which have versatile and multifaceted programmes dealing with oceans and coastal areas. The common experience of both organizations, based on more than a decade of fruitful and close cooperation in numerous joint programmes, has confirmed that meaningful and lasting environmental protection is indeed inseparably linked with social and economic development. Against this background, and as part of IOC's and UNEP's preparations for the 1992 United Nations Conference on Environment and Development (UNCED), an attempt was made by the secretariats of UNEP and IOC to analyze the present problems of the marine and coastal environment and to formulate strategies which may contribute to the solution of these problems, taking into account the issues raised in General Assembly resolution 44/228. The causes of the problems are often beyond the scope of IOC and UNEP, as are many of the strategies for addressing these problems. Nevertheless, ***it is expected that the present document will provide a useful guide for common strategies of UNEP and IOC in dealing with marine and coastal affairs and thus will strengthen the capacity of these organizations, and the United Nations system as a whole, to respond in a more concerted and coherent way to the present and forthcoming environmental problems.***

2. HIGHLIGHTS

Importance of the oceans, coastal areas, and their resources

2.1 The oceans have always had and will continue to play a decisive role in shaping the life on this planet. The global energy budget and the biogeochemical processes on which all life depends are critically influenced by the oceans.

2.2 The interactions between the oceans and the coastal terrestrial environment are numerous and very intimate. The ecological systems of the oceans are inseparably linked with those in coastal areas and the socio-economic developments of the coastal areas are determined to a large degree by the conditions created by the proximity of the oceans. Nowhere is this mutual interdependence and influence so evident as in the coastal and near-shore zones of enclosed and semi-enclosed seas, and on islands. Therefore the protection of the marine environment and the use of its resources cannot be considered separately from land-based activities.

2.3 The near-shore maritime areas contain the largest part of commercially exploitable marine living and mineral resources. They are also the zones used for mariculture, whose potential is yet to be fully developed.

2.4 Due to the numerous advantages offered by the coastal and near-shore areas,[1] they have since antiquity been among the most intensively used and abused parts of our globe. More than half of today's population lives on

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[1] In the context of this document the term "open oceans" is used for the seaward part of the oceans from the outer limits of the exclusive economic zones, while the "coastal and near-shore areas" are defined as the landward part of the oceans from the outer limits of these zones, together with the adjacent terrestrial environment which influences or is influenced by this part of the ocean.

the sea-shores or in their immediate proximity; a variety of industries have developed on a large scale along the coast; the coastal zones are a major recreational area and the basis for expanding tourism; harbours are essential as centres for national and international transport and trade.

2.5 The global water circulation regime and the global climate are heavily influenced by the Antarctic continent and the Southern Ocean. At the same time they are, apart from the exploitation of marine mammal populations, the last frontier on the earth preserved in virtually intact conditions.

Main problems and their causes

2.6 The nature of the problems affecting the marine and coastal environment has not altered greatly in the past decades. However, the incidence and extent of human activities in the coastal areas, as well as our perception of the main threats and corresponding solutions have changed markedly on the basis of knowledge and experience accumulated over the same period. Today the environmental problems are recognized as problems stemming from population pressure combined with inadequate or improper development whose ultimate solution should be sought in resolving conflicting interests for space and resources in the framework of environmentally sound economic development.

2.7 Aside from some living resources, the open oceans seem to be still largely unaffected, but the physical and ecological degradation of coastal areas and the increase in pollution of near-shore waters from land-based sources are accelerating at an alarming pace. The often dramatic and irreversible alteration of natural coastal ecosystems and the extensive pollution of the sea are primarily caused by the rapid growth of coastal populations, the expansion of recreational areas, and the concentration of industrial development in coastal zones, accompanied by inadequate environmental, technological and economic policies. The situation in many enclosed and semi-enclosed seas is of particular concern, largely due to the physical degradation of the coastal and near-shore areas, and pollution from land-based sources or from major maritime accidents, such as the one involving the "Exxon Valdez".

2.8 The expected impact of predicted climate changes will exacerbate the present problems and may, in areas such as low-lying islands and coastal zones, significantly influence or even imperil their future development and use. The predicted climate changes will certainly affect marine living resources in many ways. Large-scale changes in total marine fisheries production are not expected, although individual stocks may suffer. Mariculture will probably be more affected. Tropical upwelling zones, which produce large amounts of fish resources, may shift polewards by hundreds of kilometres. The year to year variability of the resources they support may increase and the increased plankton productivity may reduce oxygen levels and lead to anoxic situations. The increased ultraviolet radiation related to ozone layer depletion may lead, according to some estimates, to detrimental effects on some shallow water ecosystems such as coral reefs, and may affect plankton growth.

2.9 The oceans and coastal areas are still not considered as finite economic assets which can be used on a sustainable basis only by prudent and rational exploitation. This is particularly evident when development plans and environment protection confront conventional spending priorities. Therefore relatively low priority is assigned in most national development plans to the protection of these areas and to rational use of their resources. The result is a scarcity of funds needed for measures which

could prevent, reduce or eliminate pollution of the marine environment, halt the physical degradation of coastal areas and protect their resources. In reality, such an approach leads to seriously reduced capacities for social and economic development. The poorer countries are particularly vulnerable to this vicious cycle.

2.10 The situation is particularly serious in economically disadvantaged countries burdened by depletion of natural resources, heavy indebtedness, unstable commodity prices and unfavourable trading systems. International assistance which would allow disadvantaged countries to cope with their environmental problems, often originating from the industrialized world (e.g. global climate change), is inadequate, frequently even misguided, and is not commensurate with the magnitude of the problem to be solved.

2.11 The polar regions contain some of the most fragile ecosystems. Indiscriminate exploitation of their living resources has already brought some mammal species to the brink of extinction which may have caused a serious imbalance in the natural ecosystems.

2.12 War is among the most destructive and wasteful human activities. Its direct and indirect impact on the environment, economy and human well-being are enormous and, as demonstrated by the consequences of the recent hostilities in the Gulf, can reach catastrophic dimensions, covering large geographic areas.

2.13 The capabilities of most countries, especially the developing ones, are still generally insufficient to cope adequately with the full complexity of assessing the problems facing their marine and coastal environments and the rational management of their resources. National institutional structures are generally too weak and lack the interdisciplinary expertise needed for effective action. This weakness of national structures also seriously hampers the effective participation of many countries in international efforts designed to protect and develop the marine and coastal environment.

2.14 The protection of the marine and coastal environment is reflected in the national legislation of most countries and in numerous international agreements. However, the provisions of these legislative acts are not applied efficiently to guarantee development without undermining the natural resource-base.

2.15 Public awareness about the nature, extent and implications of the problems of the marine and coastal environment needs to be considerably increased, although in some countries it already plays an important and highly visible role in mobilizing support from broad segments of the population for the necessary societal decision-making needed for the protection of this environment and a more rational utilization of its resources.

2.16 The knowledge accumulated over the past decades about the magnitude and the main causes of the problems is considerable and sufficient to indicate that the situation is serious and calls for urgent action. The technological solutions to most of these problems are also quite well known and are available, at a price. However, the present databases and understanding of the processes shaping the natural conditions of oceans and coastal areas are generally inadequate for management purposes and for reliable predictions about the trends in these conditions. Consequently, forecasts for changes that may be expected contain a relatively high degree of uncertainty.

2.17 In summary, four main factors, none of them specific to the marine and coastal environment, seem to be at the root of the present environmental problems hampering sustainable development:

(a) Inappropriate national and international economic policies and forms of development which do not take into account adequately the environmental consequences of these policies;

(b) Weak regulatory mechanisms and administrative systems dealing with environmental issues;

(c) Insufficient public awareness about the real causes and magnitude of environmental problems, and about the available remedial measures; and

(d) Inadequate forecasting of emerging environmental problems.

Remedies

2.18 *Sustaining human life and well-being requires development and a healthy environment.* Development can become difficult to achieve if natural resources are depleted or the environment degraded. Therefore, the *ultimate goal* of all strategies for the development and protection of the oceans, coastal and near-shore areas and their resources should be to ensure their *rational use.* In case of *renewable resources*, rational use must imply *indefinite sustainable use.* The use of *non-renewable resources*, obviously, cannot be sustained indefinitely, but must provide the economic basis for the build-up of activities and conditions that will ensure or contribute to a *long-term and sustainable socio-economic development*, once the non-renewable resources are exhausted. Consequently, all remedies for the present and anticipated environmental and developmental problems should be designed with that goal in mind, and their appropriateness should be judged by the degree to which they succeeded in achieving that goal.

2.19 The problems of the oceans, coastal areas and their resources are of global significance and hence their solution requires *global environmental strategies inseparable from global development strategies.*

2.20 The present problems are most evident in coastal and near-shore areas under the direct onslaught of man's activities. Although seemingly local in nature, these problems are so widespread and are so evident, even at sites far away from their origin that only globally applied strategies have a chance to achieve *long-term solutions.* However, the type and intensity of measures and policies, if they are to be effective, must be made in response to the actual situation, bearing in mind that a solution at one site should not create a nuisance elsewhere. Consequently, the most cost-effective remedies should be sought through *action on the local and national level, undertaken in the framework and as part of wider regional and global development strategies*, including the transfer of the necessary resources, technology, knowledge and skills to the disadvantaged countries.

2.21 The protection of the open oceans and of their resources obviously requires a *global approach* because uncoordinated local or unilateral national action cannot contribute significantly to the solution of the problems. The exploitable living and non-living resources of the Southern Ocean require a specially restrictive management regime.

2.22 Due to the extreme fragility of the Antarctic ecosystems, the recent decision of the parties to the Antarctic Treaty to strengthen environmental safeguards and to *prohibit the exploration and exploitation of mineral resources of the Antarctic region* for 50 years, is especially significant.

2.23 The application of *environmentally sound management practices* in coastal and maritime activities, rather than narrowly defined "conservation", is now accepted as one key to safeguarding and developing the marine and coastal environment and their resources. The unplanned or poorly planned land- and sea-use practices, the irrational exploitation of natural resources, and the pollution to which they incidentally give rise can be avoided only by these means. Management implies use: *rational use*. Emphasis on the concept of *integrated management* reflects a critical change from the earlier views of most environmentalists that the oceans had to be preserved unchanged rather than used rationally.

2.24 The seas have no physical boundaries to prevent movement of polluted waters. Therefore, global or regional strategies are needed to *control transboundary pollution from land-based sources*, including pollution reaching the marine environment through rivers and the atmosphere. The strengthening and enforcement of the 1977 Geneva Convention on the *prohibition of military or any other hostile use of environmental modification techniques* should be urgently considered by the international community.

2.25 Accidents resulting in damage to the coastal and near-shore environment, such as the pollution caused by tanker accidents, cannot be completely avoided. Nevertheless, with measures aiming at improved safety of navigation, with improved design of ships, and with the formulation and adequate implementation of *contingency and emergency plans*, the number of accidents could be reduced and their environmental impact could be considerably mitigated.

2.26 Although the effects of predicted climate changes may not be felt in the near future, in the long term their implications for the socio-economic life of coastal zones may be considerable and particularly serious for low-lying countries and small islands. *Adaptation to the changing conditions* will require a long lead-time. Therefore the full complexity of the potential problems which may be associated with predicted climate changes should be analyzed without delay and the possible *policy options and measures* which may be used as suitable responses to the expected impacts should be examined and reflected in the national *integrated coastal zone management plans*.

2.27 The policies, measures and arrangements for the protection and use of the marine and coastal environment, if they are to be rational and thus effective in the long term, should be based on an *improved understanding* of marine and coastal ecology, including ecosystem dynamics; of the relevant ocean processes; and of their interaction with terrestrial and atmospheric systems.

2.28 *Long-term systematic research and observation* programmes should be organized according to a globally coordinated strategy to *monitor the changes* in the state of the marine and coastal environment and of ocean processes, and their interaction with atmospheric and terrestrial processes. The results of the research and observations should be critically evaluated and widely disseminated through easily accessible databases.

2.29 The national institutions in charge of environmental protection in many countries are usually weak or even non-existent. Their influence on national development plans is frequently only of marginal importance. Without creating *strong national infrastructures*, equipped with interdisciplinary expertise, and without giving them access to the circles where decisions relevant to the protection of environment are made, no effective protection of coastal and marine environment could be expected.

2.30 The protection and development of seas and coastal areas require a variety of expertise, and above all a good grasp of the cross-sectoral nature of environmental protection. While narrow, sectoral technical expertise exists in most countries, greater efforts should be devoted to the *training* of experts in interdisciplinary skills.

2.31 Effective protection of the oceans can be achieved only through a high level of *intergovernmental cooperation*. It is essential, therefore, to strengthen and expand the *multilateral programmes and agreements* designed to protect the marine and coastal environment according to the specific needs of the countries concerned. *Assistance to the economically disadvantaged countries* must be part of arrangements supporting intergovernmental cooperation.

2.32 Existing *global and regional agreements*, although not universal remedies, are among the most forceful international arrangements providing the legal basis and signifying the *political commitment* for joint action. Therefore, broader adherence to the existing agreements and strict application of their provisions would contribute considerably to the protection of the marine and coastal environment. Whenever appropriate, existing agreements should be expanded or adapted to the changing needs of the countries concerned, and additional agreements should be adopted to regulate subjects not covered by existing agreements.

2.33 Although *transfer of technology, experience and data*, provision of *training*, as well as *financial assistance, preferential treatment and compensation for damage* are usually among the provisions of existing international agreements, the developing countries have benefited relatively little from such provisions. Therefore, *fostering of global solidarity* must be an essential element of all international agreements.

2.34 The widest *popular participation* in the protection of the marine and coastal environment is essential. Such participation necessitates the involvement of those who may be affected by changing environmental conditions in *decision-making debates* about development schemes which may cause such changes. It also requires broad *educational and public awareness programmes*, including introduction of environmental subjects in school curricula on all levels, as well as the provision of regular information to the general public through mass media and special publicity campaigns about the environmental and developmental issues. Such publicity campaigns should emphasize the importance of the potential *contribution from each individual* to maintain a healthy environment as a basic precondition for sustainable socio-economic development.

2.35 The lack of funds, particularly in developing countries, is the crucial and single major impediment for more forceful environmental protection action. The remedy, without which all measures and decisions will remain only at the level of declarations, is in the provision of *financial resources* additional to those currently available, enabling the disadvantaged countries to become *equal partners* in dealing with global economic and environmental issues. The financial resources required are of unprecedented magnitude, unlikely to be met from regular government

budgets. They could come from an increased flow of assistance through the mechanisms of *international agreements*, from radical expansion of the present *bilateral arrangements* between developing countries and lending/funding/donor/aid agencies and countries, or from new *multilateral funds* through which such resources would be channelled to disadvantaged countries.

2.36 However, no combination of policies, technologies and resources can significantly ameliorate the present situation unless the *non-technological roots of the problems* are resolved: population pressure on limited resources and space, competitive nationalism, the global maldistribution of wealth and opportunity, patterns of consumption, the notion that economic growth and human well-being are directly proportional and, last but not least, the illusion that supposes civilizations to be self-supporting without help from natural ecosystems. Obviously, in order to achieve this a *new attitude based on global solidarity* would be required.

3. STRATEGIES

3.1 The degradation of the marine and coastal environment is today clearly recognized as a global problem rooted in the complex political, social and economic circumstances of our planet. Consequently, the solution of the problem requires a coherent global approach and a coordinated stepwise programme of action which would deal not only with the present manifestations and direct causes of the problem, but also with its very roots. Furthermore, being a global problem it cannot be solved by individual countries without effective international cooperation, although solutions should be sought primarily through concrete national actions taken within a globally agreed framework.

Overall goal

3.2 The overall goal of the protection and development of the oceans and coastal areas is to ensure their sustainable use and development without jeopardizing their ecological integrity.

Elements and principles of general global strategy

3.3 Effective protection and development of the oceans and coastal areas require an integrated and holistic approach and a general global strategy to implement it. However, due to the number and complexity of issues involved, the general global strategy cannot cover in sufficient detail the specific aspects of each problem. Therefore, the elements and principles of the general strategy are considered in this document separately from strategies proposed as responses to specific issues, with the understanding that these elements and principles are common and applicable to all issue-specific strategies which are also global in nature.

3.4 The strategy is based on integrated coastal zone management, resting on sound scientific ground, yielding practical information required for proper management.

3.5 The following elements and principles are considered as valid for a general strategy and as relevant to the formulation, adoption and implementation of all issue-specific strategies:

Principles

(a) The need for the protection and development of the oceans and coastal areas is a global problem requiring a coherent, sequential and well-coordinated global approach;

(b) The oceans and coastal terrestrial areas, including river drainage basins, are linked in complex ecological and economic systems, and therefore their protection and development should be considered as interdependent;

(c) A set of general and of issue-specific global strategies, accompanied by concrete programmes of action, and supplemented by regional and national strategies and programmes of actions, should be applied to the protection and development of oceans and coastal areas;

(d) The strategies for the protection and development of the marine and coastal areas should be part of wider strategies ensuring sustainable social and economic development on local, national, regional and global levels;

Level of action

(e) Solutions to the problems should be sought primarily through concrete national actions, taken within a globally agreed framework;

(f) Problems common to, or specific for, a certain geographic region should be addressed through regional cooperation between the countries concerned, in order to reinforce and facilitate action on the national level, and to avoid conflicting results from action taken by individual countries;

Commitment to action

(g) The general and issue-specific strategies, as well as the global and regional programmes of action should be based on the unambiguously expressed political commitment of countries participating in such programmes, preferably in the form of legally binding international agreements;

Modality of action

(h) Each strategy should be accompanied by a concrete programme of action, indicating:

- The goals and targets to be achieved;
- The timetable envisaged for achieving the goals and targets;
- The actors to be involved and their respective responsibilities;
- The costs to be met and the sources of funding; and
- The expected benefits from the implementation of the strategy and the programme;

(i) The national, regional and global programmes of action, if they are to be viable, must be realistic, i.e. within the limits of the economic capabilities of the countries which are expected to apply them, and should be socially and politically acceptable;

(j) The relevant existing regional and global programmes and mechanisms should be strengthened and used, as far as possible, for the implementation of the strategies and programmes of action adopted for the protection and development of the oceans and coastal areas;

(k) When developing new regional or global programmes, the relevant existing programmes should be fully taken into account in order to avoid duplication of efforts and competition for the use of the available national institutional infrastructures and expertise;

(l) Programmes based on a donor/recipient relationship between developed and developing countries should be carried out by taking into account the recipient countries' real needs, priorities and capabilities to absorb, maintain and operate the results of aid projects;

(m) Action should not lead to an uncritical transfer of problems from the marine and coastal environment to other sectors of the biosphere;

Support to action

(n) International intellectual and technical assistance should be made available to developing countries and countries with economies in transition, in order to improve their capabilities for environmentally sound development and to facilitate their full participation in the implementation of the adopted strategies and programmes of action;

(o) Financial resources, additional to those presently available, should be provided to developing countries and countries with economies in transition, and their access to cleaner technologies under favourable financial terms should be ensured;

(p) Special financial assistance should be made available to countries which may be affected by problems largely created by activities beyond their control (e.g. impact of expected climate change);

(q) Free exchange of data, information and experience, as well as intensive training activities relevant to the implementation of the strategies and programmes of action should be organized at all levels in a systematic and well-coordinated way, using existing mechanisms for information sharing and training as far as possible;

Coordination of action

(r) The implementation of adopted strategies and programmes of action should be coordinated and supervised on national levels by national institutions with appropriate authority, adequate technical capability and sufficient financial resources;

(s) The adopted regional or global strategies and programmes of action should envisage institutional mechanisms and financial support to facilitate and ensure the coordination and implementation of the strategies and corresponding programmes, compliance with their provisions and monitoring of their effectiveness.

Issue-specific global strategies

3.6 The general outline of possible issue-specific global strategies is presented in the ensuing paragraphs. Each of these outlines would have to be elaborated in greater detail to meet the requirements indicated in paragraph 3.5(h). For an example of an elaborated issue-specific strategy the reader is referred to document UNEP(OCA)/WG.14/3.[2]

3.7 The issue-specific strategies should not be considered in isolation from each other, but as integral parts of a general strategy, because the subjects they are treating are only in very rare cases independent from subjects treated in several other issue-specific strategies. In developing programmes of action for strategies dealing with control of pollution, management of resources, biological diversity, emerging environmental issues and response to environmental emergencies, the strategies covering cross-sectorial issues (i.e. improved coastal zone management; research; education and public awareness; strengthening of national institutions; non-governmental organizations; business and trade communities, financial institutions; international cooperation) should be taken fully into account.

Control of pollution from land-based sources[3]

3.8 *Problem*: Aside from physical and ecological degradation of the coastal and near-shore zones, pollution from land-based sources is at present the single most important threat to the marine environment and impediment to the use and sustainable development of the oceans and coastal areas, and their resources. Land-based sources contribute about 77 per cent to the pollution load of the oceans.

3.9 *Goal*: Adoption of a global plan to address marine pollution from land-based sources, including the identification of actors, costs and sources of funding.

3.10 *Target*: Global reduction by the year 2000 of pollution from land-based sources to 1990 levels, with a programme of continuing reduction in succeeding years.

3.11 *Costs and benefits*: Solutions to the problem may be costly (several hundreds of billions of US dollars) but the benefits derived and the value of damage and resources at risk (including health, fisheries, tourism, etc.) in many cases far outstrip these costs.[4]

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[2] Strategy for the reduction of the degradation of the marine environment from land-based sources of pollution and activities in coastal areas.

[3] See footnote 2.

[4] See documents UNEP(OCA)/WG.14/3, UNEP(OCA)/WG.14/Inf.8 and UNEP(OCA)/WG.14/Inf.9 analysing the costs and benefits of measures for the reduction of the degradation of the environment from land-based sources of pollution and activities in coastal areas.

3.12 *Strategy*:

(a) Formulation of a costed and targeted global programme of action, with a timetable for its implementation, within a frame of reference of globally applicable principles, approaches and measures;

(b) Global political commitment, on the highest political level, to the agreed elements of the global strategy and programme of action, together with their underlying principles, approaches and measures;

(c) Early implementation of the global programme of action through well-designed concrete national action plans, as well as through existing and new regional agreements and programmes of action;

(d) Making available additional financial resources and facilitating access to cleaner technology by developing countries and countries with economies in transition;

(e) Preparation of a global inventory of land-based sources of pollution and databases on their effects through well-coordinated regional, sub-regional and national efforts;

(f) Assessment of the ecological, social and economic significance and impact of these sources and determination of national, subregional, regional and global problems and priorities in controlling the sources;

(g) Establishment of an international fund for the application of appropriate sewage treatment technologies;

(h) Establishment of a clearing-house on marine pollution control information; and

(i) Establishment of adequate institutional mechanisms and financial support to ensure the global coordination and monitoring of the implementation of the agreed programme of action, including its underlying principles, approaches and measures.

Control of pollution from dumping

3.13 *Problem*: Dumping of waste from ships and aircraft contributes about 10 per cent of the pollution load of the oceans. It poses a problem for benthic marine ecosystems, and may affect some commercially exploitable living resources. Certain types of waste dumped into the oceans may have a considerable long-term environmental impact.

3.14 *Goal*: Progressive reduction of harmful waste dumped into oceans. Elimination of waste which, due to its nature (e.g. radioactive waste, waste with low degradation rate), may pose a long-term threat to the quality of marine environment.

3.15 *Strategy*:

(a) Broader adherence to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and regional agreements on the same topic; and

(b) Stricter application of the provisions of existing global and regional agreements on control of dumping.

Improved coastal zone management

3.16 *Problem*: Inadequate coastal zone planning, development and management contribute to the physical degradation of the coast, to destruction of the integrity of coastal and near-shore ecosystems and imperil the sustainable exploitation of their resources and amenities. Most of the problems associated with pollutants from land-based sources are the consequence of inadequate coastal zone management and inappropriate land-use practices in drainage basins.

Goal: Wide application of integrated management of coastal zones and river basins, based on sound planning and responsible policies for management of the environment and its resources.

3.17 *Strategy*:

(a) Wide application of environmental criteria in land- and sea-use zoning of coastal development; and

(b) Mandatory assessment (environmental impact assessment) of the likely environmental impact, related social and economic costs and benefits, and long-term effects of all planned activities and projects which may affect the quality of the environment.

3.18 The strategy would benefit from:

(a) Changes in the present patterns of national economic and social development (e.g. tourism, concentration of industries in coastal zones, demographic pressures on the coastline), taking into account viable alternatives;

(b) Development and application of economic and fiscal policies and measures stimulating environmentally sound coastal zone developments; and

(c) Restrictions on coastal activities and development which may directly or indirectly affect the quality of the marine environment, its resources, and amenities.

Sustained management of living resources[5]

3.19 *Problem*: The current rate of fisheries harvest is close to the estimated maximum sustainable yield, with about 95 per cent of the world marine catch (close to 80 million tons per year) coming from near-shore waters. A number of important fisheries resources, including some marine mammals, are generally over-exploited. Ecosystems such as mangroves, wetlands, coral reefs and seagrass-beds are imperilled in many parts of the world by ill-conceived developmental schemes, over-exploitation, pollution, siltation and land-reclamation. The enforcement of measures for environmentally sound management of living resources is inadequate.

3.20 *Goal*: Protection of living resources from over-exploitation. Maintenance of the integrity of coastal and marine ecosystems.

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5 This strategy should be closely coordinated with the strategy for the protection of biological diversity.

3.21 *Strategy*:

(a) Integration of living resource management plans into larger-scale integrated coastal zone management plans;

(b) Protection of the integrity of ecosystems by removing the factors impinging on that integrity;

(c) Expansion of the exploitation of unconventional fisheries resources;

(d) Environmentally sound management of existing and expanding aquaculture;

(e) Protection of artisanal fisheries and the access of indigenous people to the living resources exploited by them traditionally;

(f) Application of environmentally sound administrative and legal measures, and technologies, for the exploitation of living resources on a sustainable level, including:

- Measures for reduction of incidental capture of non-target species, including marine mammals, turtles and birds;

- Restriction on large-scale pelagic driftnet fishing in areas where it may deplete the stocks of living marine resources; and

- Limitations on the access to endangered stocks;

(g) Adoption of economic measures and fiscal policies stimulating the protection and rational exploitation of living resources; and

(h) Regional and global collaboration on all issues relevant to the management of living resources shared between several countries.

Maintaining biological diversity[6]

3.22 *Problem*: The marine environment is, in general, resilient to the loss of biological diversity, but some heavily exploited or stressed near-shore and coastal ecosystems (coral reefs, lagoons, mangroves, wetlands, estuaries) and certain large marine mammals are clearly threatened.

3.23 *Goal*: Maintaining the integrity and biological diversity of coastal and marine ecosystems.

3.24 *Strategy*:

(a) Protection of habitats and ecosystems critical for the maintenance of biodiversity and survival of endangered species, taking into account the viable alternatives;

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[6] The strategy should be part of a broader global strategy on protection of biodiversity and should be considered in conjunction with the strategy for the management of living resources and management of coastal zones appearing in this document.

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(b) Restriction on the commercial exploitation of species considered endangered, such as some marine mammals;

(c) Stricter control on the trade in endangered species;

(d) Stricter control on the genetic manipulation of species which may be exploited in mariculture;

(e) Stricter control on the deliberate and accidental introduction of alien species which may impoverish biodiversity; and

(f) Broader adherence to the global and regional agreements protecting biodiversity and stricter adherence to their provisions.

Rational exploitation of non-living resources[7]

3.25 *Problem*: Careless exploration and exploitation of mineral resources may lead to habitat destruction and pollution.

3.26 *Goal*: Exploitation of mineral resources without environmental damage and keeping in mind the long-term economic interest of the countries exploiting them.

3.27 *Strategy*:

(a) Application of measures and technologies in the exploration, extraction, processing and transportation of mineral resources which do not cause environmental damage;

(b) Mandatory decommissioning of installations which stopped being used in exploration and exploitation of sea-bed, and their disposal without damage to the environment;

(c) Supplementing the general provisions of the United Nations Convention on the Law of the Sea dealing with the protection of the marine environment from pollution arising from the exploration and exploitation of the sea-bed by more specific regional agreements safeguarding the environment from such pollution;

(d) Identification of additional geographic regions and locations where non-living resources could be exploited; and

(e) The exploitation of non-renewable mineral resources should be used to provide the economic basis for build-up of activities and conditions which will ensure or contribute to a long-term and sustainable socio-economic development, once the resource is exhausted;[8]

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[7] Most of the mineral resources cannot be considered as renewable on the time-scale on which their exploitation is taking place.

[8] This applies to mineral resources exploited under national jurisdiction. The exploitation of the mineral resources outside of national jurisdiction is governed by the provisions of the United Nations Convention on the Law of the Sea.

Emerging global environmental issues[9]

3.28 *Problem*: In the long term, the impact of predicted climate changes, especially the various direct and indirect effects of the expected sea level rise (65 ± 35 cm by the end of the next century) and the increased frequency and severity of episodic events (e.g. tropical storms) may prove to be among the major social, developmental and environmental problems facing the low-lying coastal areas and islands.

3.29 *Goal*: Preparedness for taking suitable measures needed to prevent or adapt to the expected impact of climate changes.

3.30 *Strategy:*[10]

(a) Identification of particularly vulnerable resources, developmental activities, species, ecosystems and geographic areas;

(b) Preparation of detailed assessments of the potential site-specific impacts on ecological systems and socio-economic activities;

(c) Consideration of options for response policies and measures which may mitigate or eliminate the negative effects of the impact;

(d) Development and timely implementation of the most suitable response policies and measures in the framework of national integrated coastal zone management plans; and

(e) Reduction of activities which may provoke or accelerate climate changes.

Management of open oceans[11]

3.31 *Problem*: The management of the resources of the open oceans, including those found in or on the underlying sea-bed and ocean floor, is envisaged to be regulated by the general provisions of the United Nations Convention on the Law of the Sea.

3.32 *Goal*: Environmentally sound management of the resources of the open oceans.

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[9] The proposed strategy deals only with expected climate changes, although additional major problems may be identified in the future.

[10] The strategy should be part of a broader strategy developed within the framework of the Intergovernmental Panel on Climate Change. It should also be taken into account in the implementation of all other issue-specific strategies described in this document.

[11] The specific aspects of this strategy are covered by a number of other strategies suggested in this document, notably those for control of pollution from dumping, sustained management of living resources, protection of biological diversity, rational exploitation of mineral resources, response to environmental emergencies, research and monitoring/observations.

3.33 *Strategy*:

(a) Broader adherence to and implementation of international ocean treaties, including the United Nations Convention on the Law of the Sea.

Response to environmental emergencies

3.34 *Problem*: Maritime accidents, such as ship collisions or oil well blow-outs, are the most common environmental emergencies affecting the oceans and coastal areas. As revealed by the recent incident involving the "Exxon Valdez", accidents, even when they occur in the most developed countries, lead to massive local environmental damage.

3.35 *Goal*: Reduction of the number and severity of maritime accidents, and improved response capabilities.

3.36 *Strategy*:

(a) Assessment of resources, economic activities, species, ecosystems and geographic areas at special risk in case of environmental emergencies;

(b) Formulation and adoption of national, subregional and regional contingency plans for environmental emergencies;

(c) Development of national and regional response capabilities (institutions, expertise, manpower, material, equipment and financial resources);

(d) Improved safety of navigation and activities related to the exploration and exploitation of mineral resources; and

(e) Broader adherence to existing and adoption of additional bilateral and multilateral agreements for cooperation and assistance in cases of emergency, including schemes for determining liability and providing compensation in case of transboundary damage.

Research[12]

3.37 *Problem*: The existing vast number of unknowns and uncertainties in the natural, technical, social and political sciences hamper a more effective application of science to the protection and development of the oceans and coastal areas.

3.38 *Goal*: Improved understanding of the environmental, technical and societal roots of the present day obstacles for sustainable development and improved forecasts for changes which may occur in the future.

3.39 *Strategy*: Intensified target-oriented research and studies on:

(a) Factors and processes determining and influencing the response of living resources to exploitation;

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[12] Most of the topics treated in this strategy are in direct support of activities envisaged by other strategies described in this document.

(b) Restoration of damaged coastal ecosystems and depleted fisheries stocks;

(c) Tolerance of some ecosystems (e.g. mangroves, coral reefs) to the expected rate and magnitude of sea-level and temperature elevations;

(d) Scientific rationale for environmental quality criteria;

(e) Biogeochemical fluxes of contaminants entering the marine environment from all sources, including those entering through rivers and atmosphere;

(f) Effects of contaminants (including nutrients) on marine organisms with emphasis on in-situ studies of the cumulative effects of long-term low-level exposures of ecosystem to a variety of contaminants;

(g) Processes leading to eutrophication and excessive algal blooms;

(h) Toxicity and other biological effects of new substances being introduced into the marine environment;

(i) Role of the oceans in the climate system;

(j) Impact of ozone layer depletion on primary productivity of the oceans, and on intertidal and coastal ecosystems, including coastal agriculture and silviculture;

(k) Less wasteful production technologies, i.e. technologies with high energy efficiency and a low amount of waste;

(l) Improvement of existing and development of new technologies for treatment and reuse of industrial and domestic wastes;

(m) Potential use of oceans as a source of renewable energy (e.g. waves and tides, thermal and salinity gradients) and its environmental implications;

(n) Methodologies related to planning and managing sustainable development, such as:

- Environmental impact assessment with good predictive capabilities;
- Environmental accounting;
- Cost-benefit analysis of environmental protection measures;
- Comparative analysis of alternative development options;
- Limited access regimes in fisheries;
- Management techniques for coastal areas, such as zoning of uses and different type of use or protection regulations;
- Risk assessment and management;

(o) Effectiveness of economic measures, and in particular fiscal incentives, which are or may be used in controlling environmental degradation or contribute to the restoration of damaged systems;

(p) Effective use of media and publicity campaigns in promoting public awareness about the advantages and need for sustainable development; and

(q) Societal response to short-term disadvantages of measures taken to ensure environment protection and sustainable development in the interest of long-term benefits, and how to overcome the eventual negative responses.

Observations, monitoring and forecasting

3.40 *Problem*: The information and data collected through the present monitoring and observation systems are insufficient to meet all the demands posed by the protection and development of the oceans and coastal areas, and rational management of their resources. The available information is particularly inadequate in providing clarification and answers to the questions raised in connection with forecasting environmental degradation and impact of climate change.

3.41 *Goal*: Improved understanding of the dynamics (rate, direction, interdependence) of changes in the natural environment and socio-economic development, long-term monitoring, and operational forecasting.

3.42 *Strategy*:

(a) Reorientation, as far as applicable and feasible, of existing monitoring and observation programmes toward subjects of direct relevance to the protection and development of oceans and coastal areas;

(b) Initiation of the planned Global Ocean Observing System as a multi-purpose long-term observation system designed to provide effectively and on a routine basis information needed for climate prediction and management of the oceans and coastal areas;

(c) Monitoring of effects attributable to climate changes (e.g. sea-level rise, changes in ocean circulation patterns and their impact on fisheries);

(d) Monitoring of natural long-term dynamics of fisheries resources and associated ecosystems;

(e) Monitoring of the dynamics of coastal development (e.g. population, industry, tourism) and its environmental impact;

(f) Improved data management (reporting, quality control, analysis, synthesis, dissemination);

(g) Use of data and information resulting from monitoring and observation systems, as well as from research, in developing scenarios and predictive models; and

(h) Improved coordination and interaction between the existing monitoring/observation systems and those that may be launched in the future.

Education and public awareness

3.43 *Problem*: There is a lack of adequate public understanding of the short- and long-term benefits and disadvantages of economic, including fiscal, and environment protection measures. This lack seriously weakens the societal decision-making process needed for the sustainable development of the oceans and coastal areas.

3.44 *Goal*: Improved understanding of the linkages between development and environmental protection by the general public.

3.45 *Costs and benefits*: The investment in education and public awareness building is relatively small when compared with investment in development, and is the most cost-effective contribution to sustainable development.

3.46 *Strategy*:

(a) Addressing to parents systematic educational programmes suitable for transfer of environmental awareness to their families, and to children in particular;

(b) Raising the interest of the general public in environmental and developmental matters by involvement in the planning and decision-making process;

(c) Introducing materials on developmental issues and associated environmental problems into school curricula on all levels of formal education;

(d) Intensive and more frequent use of all standard channels of communication with the public at large (i.e. newspapers, radio, television) for transmission of information on the inseparable link between the socio-economic development and protection of the environment; and

(e) Organization of special publicity campaigns to inform the public about major developmental projects and their environmental, economic and social implications.

Strengthening national institutions

3.47 *Problem*: The capacity of many countries to ensure sustainable development is seriously hampered by weaknesses in national institutions and mechanisms which prevent them dealing adequately with the cross-sectorial issues pertaining to environmentally sound development.

3.48 *Goal*: Development of strong national institutions and structures for the coordination and implementation of national developmental and environmental policies.

3.49 *Strategy*:

(a) Establishment of stronger links between national institutions and structures responsible for the formulation, coordination and implementation of national social, economic and developmental strategies and environmental policies;

(b) Replacement of the sectoral approach to developmental issues by an inter-sectoral approach in which environmental considerations play a significant role; and

(c) Building up of expertise in interdisciplinary subjects (e.g. environmental economics) by intensive training activities and by transfer of experience and "know-how" through international cooperation and assistance.

Non-governmental organizations

3.50 *Problem*: The concern of citizens about environmental and developmental issues is frequently expressed through non-governmental pressure groups which are too often treated by Governments, business, financial and trade communities as certain adversaries rather than potential allies.

3.51 *Goal*: Strengthening of the societal decision-making process by involvement of non-governmental pressure groups.

3.52 *Costs and benefits*: No costs to Governments, but considerable benefits in terms of easier acceptance and implementation of environmentally sound developmental policies.

3.53 *Strategy*:

(a) Broader involvement of non-governmental pressure groups in the decision-making process through consultations between them and the relevant government structures on major issues related to environment and development;

(b) More freedom and opportunity for non-governmental organizations to express their views in international fora; and

(c) Encouragement of non-governmental organizations to participate in the implementation, or to facilitate the implementation of national and international programmes contributing to environmentally sound and sustainable development.

Business and trade communities, financial institutions

3.54 *Problem*: The business and trade communities, and financial institutions, in both the public and private sector, are primarily interested in development activities which frequently do not take sufficiently into account either the environmental consequences or the long-term economic costs and benefits from these activities for society as a whole.

3.55 *Goal*: Full participation of the business and trade communities, and financial institutions in the protection of the oceans and coastal areas through environmentally sound development.

3.56 *Strategy*:

(a) Increased public sector investments in environmentally sound developmental projects and environment protection measures, such as application of clean technologies;

(b) Stronger partnership between the public and private sectors, particularly in fields where the private sector does not have enough economic incentives to provide funds for research, development and initial capital investment;

(c) Wider application of economic and fiscal measures (e.g. subsidies, tax incentives) linked with environmental accounting, and lending policies stimulating environmentally sound developmental activities;

(d) Taking into account national security considerations in their broadest sense, e.g. the advantages offered by the conservation of non-renewable resources and exploitation of renewable resources on a sustainable basis, by reduction of imports if they can be economically replaced by domestic products, etc.; and

(e) Involvement of the private sector in the formulation of national economic and environmental goals and policies, particularly in countries where the private sector operates relatively free from the administrative control of the Government.

International cooperation and coordination through the United Nations system[13]

3.57 *Problem*: The present level of international cooperation in the protection and management of oceans and coastal areas, and the coordination of this cooperation through the United Nations system is too fragmented, sectoral, and therefore inadequate to safeguard the ecological integrity of the oceans and coastal areas and ensure their sustainable use and development.

3.58 *Goal*: Fostering and facilitating processes leading to the development of the oceans and coastal areas as an integrated social and natural system on the basis of international consensus and solidarity.

3.59 *Strategy*:

(a) Redefinition of the mandates and roles of various United Nations bodies presently dealing with the issues of development and environment, including organizational and structural changes which may be needed to fulfil efficiently the redefined mandates and roles; and

(b) Improved cooperation and coordination between United Nations bodies dealing with environmental and developmental subjects in order to eliminate the unnecessary and wasteful duplication and counterproductive competition in their work.

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[13] The strategy deals only with international cooperation in the protection and development of the oceans and coastal areas as far as it concerns the United Nations system. Obviously, the strategy may be relevant to other subject areas of concern to the United Nations system and should be seen in much wider context of international cooperation which does not involve only the United Nations system.